

# Index

- Algebraic reasoning, 62, 75, 127  
Algorithms, 63, 68, 73, 82, 85  
Analogy, 22  
Analytical mathematical abilities, 37, 40–41  
Assessment, 222–23, 226–28, 249  
    in multiple performance tasks, 156, 158  
    in open-ended tasks, 157, 162–63, 165  
    of analytical, creative, and practical thinking, 40  
    of probabilistic reasoning, 147  
    of statistical reasoning, 211  
Calculators, 258, 277  
Clarity of instruction, 30  
Classroom instruction, 62–63  
Cognition, 59, 278, 280–81  
Cognitively guided instruction (CGI), 262  
Communication, 136, 143, 188–89, 196, 203, 205, 212, 255, 266  
    in classroom discourse, 95–98, 104, 108–13, 184–87, 253, 259  
    in small-group discourse, 115–16  
    writing, 65, 158–59, 162–63, 166–67, 169, 171, 199, 249, 251, 260–62  
Computation, 11, 63, 71, 93–94, 167, 273–74  
Conceptual frameworks, 25, 149–52  
    Assessment framework, 158–59  
Conjectures, 10, 199  
Conservation, 53, 83  
Constructivism, 48, 82, 279  
Creative mathematical abilities, 38  
Creative thinking, 138–39  
Critical thinking, 138–39, 157, 271  
Curriculum, 259  
Deductive reasoning, 15, 127–29, 167, 170, 196–97  
Educational policy, 221  
Equity, 13, 221–225, 227, 277–78, 281  
Estimation, 93–94, 98  
Fiscal adequacy, 222, 229  
Flawed reasoning, 9, 181–82, 186, 247, 251, 253  
Fluid nature of thinking, 52  
Fundamental knowledge, 158–59, 162–64, 166–68, 170  
Generalizations, 2–4, 76, 112, 120, 167–68, 170, 190  
Grade-level setting  
    elementary, 2, 46, 64–65, 69, 83, 86, 93, 115, 147, 160, 210, 249, 270  
    middle grades, 3, 13, 24, 64, 70, 85, 115, 128, 147, 160, 210, 247, 251, 270  
    high school, 8, 160, 175, 188, 198, 210, 270  
    college, 175, 188, 256  
Group work, 115–16, 146, 253, 262  
Inductive reasoning, 15, 120, 127–29, 167, 171  
Inquiry instruction, 13, 95  
Knowledge  
    social, 83, 85  
    physical, 83–84  
    logicomathematical, 83, 85–86  
Knowledge models, 16  
Knowledge policies, 222, 230  
Learning potential, 56  
Learning strategies, 48  
Low-income children, 59, 221, 226  
Manipulatives, 31, 82, 84, 96, 257, 259

## Mathematical content

- average, 19, 107, 112–13
- equality, 127, 129
- equivalence, 71
- fractions, 24, 84, 86, 119, 249–50, 254
- functions, 127, 132
- geometry, 7, 17, 167, 175, 202–4, 247, 251
- graphs, 110–11, 201–2, 248, 265
- logic, 189, 191–92, 195, 199
- measurement, 93–94
- misconceptions, 182
- probability, 147–49
- ratios, 18, 107, 110, 127, 164, 167, 177–79
- roots, 201–3
- statistics, 108–10
- variables, 127, 130, 167–68, 193

## Mathematical memory, 1, 6, 8

## Mathematical properties

- associativity, 3, 71, 74, 194
- commutativity, 71, 74, 194
- distributivity, 71, 73–74, 194

## Mathematical representations, 35, 46, 76–78, 86, 108–10, 127–29, 163–64, 168, 258–59, 261

- concrete, 23, 96
- pictorial, 24, 77, 87–89, 91, 110, 132, 141
- multiple representations, 51, 140–41
- symbolic, 25, 42, 90–91, 101–4, 140

## Meaningful contexts, 107, 113, 163

## Mental models, 23

## Misconceptions, 190–91, 195, 216–17

## National Assessment of Educational Progress (NAEP), 15, 63, 82, 223, 252–53

## Number sense, 9, 86

## Operation sense, 9, 63, 68, 71

## Piaget, 46, 82

## Polya, 139

## Practical mathematical abilities, 37–38, 40–41

## Preservice teachers, 256

## Probabilistic reasoning, 147, 150, 152

## Problem posing, 14, 18, 28, 32

## Problem solving, 25, 32, 48, 115, 117, 267

## Problems, 7, 17–18, 24, 26, 69, 87, 90, 107, 115, 129, 139, 141–43, 163, 165, 168, 175, 193, 195

## Projects, 198, 203, 205

## Proofs, 5, 172, 187, 193–95, 199, 203, 274–75

## Proportional reasoning, 18, 133–34, 162–63, 166, 170–71

## Reasoning, 1, 14–15, 100, 135, 157, 170, 187, 260, 270

## and metacognition, 41

## and number operations, 62

## and reading, 201–3

## by analogy, 22

## in context, 113–14

## knowledge policies and, 222, 226, 230

## mathematical versus statistical, 207

## of young children, 46

## practical, 271

## teaching, 199, 272–73

## Reflection, 67–68

## Rubrics, 158, 160, 162, 172, 249, 251–52

## Sample probability tasks, 154

## Skepticism, 114

## Solution processes, 158–59, 162–64, 166–68

## Spatial reasoning, 120

## Statistical reasoning, 207–8, 210–11

*Statistical Reasoning Assessment*, 212

## Statistics instruction, 208

## Teacher knowledge, 224–25

## Tracking, 223

## Vygotsky, 48, 54

## Word problems, 63, 68

